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Service Development as Action Design Research: Reporting on a Servitized E-Recruiting Portal

Mary Tate
Victoria University of Wellington, Mary.tate@vuw.ac.nz

Elfi Furtmueller
Austrian Science Foundation, elfi.furtmueller@amc.or.at

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Mary Tate
Victoria University of Wellington, New Zealand
Elfi Furtmueller
Austrian Science Foundation, Austria

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Keywords: Acrion design research, Service Dominant Logic, e-Recruiting

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Abstract

In this paper we reflect retrospectively on an e-recruiting service design and development project action design research. The project itself pre-dated the publication of the Action Design Research Method by Sein, Henfridsson et al., (2011). When viewed as action design research, we find that many of the principles of ADR, such as defining the problem as an instance of a class of problem, practice inspired research, mutually influential roles and guided emergence are not only synergistic with service design, but in fact, the effective design of services embeds and requires a similar approach. To this extent, we considered ADR to be an appropriate choice for services research, development and implementation at the nexus of theory and practice. We further identified some extensions and elaborations to the ADR method in a service development context. In particular, we posit that guided emergence occurs between the theoretical foundations of a service project and the artefact development, as well as between the artefact development and the organizational context. We find that in a multi-disciplinary project, theoretical contributions may be emergent, and multiple theoretical contributions are possible using a range of different lenses. We also identify some practical difficulties with reporting the learning from service development projects. Overall, we found that ADR was likely to be a highly appropriate approach for framing and deriving learning from innovative service design projects, but may require further enhancement.

INTRODUCTION

This study reports on aspects of the design and development of service-oriented, multi-national, adaptive and extensible e-recruiting portal, which has achieved a large market share in Europe. It is one of Austria's largest e-Recruiting services with over 20,000 active resume profiles and over 10,000 job ads. The portal is based on open source, semantic web technologies, and has been syndicated and extended for specialised market niches (for example medical or IT recruiting), and different national contexts (for example, supporting qualification and credential structures from different countries. The project pre-dated the publication of the Action Design Research Method (ADR) (Sein et al. 2011), although it in many respects exemplifies ADR principles. In this paper, we offer a retrospective reflection on the project as action design research, and derive some insights for e-recruiting, the application of ADR to service development projects, and service development.

In the rest of this paper we first offer a brief literature review of the characteristics of a service; and the opportunities arising from conceptualising e-recruiting as a service. We then discuss and compare the ADR method with the experiences derived from this project. This is followed by a conclusion.

LITERATURE REVIEW

The Service Dominant Logic (SDL)

Recently within the marketing discipline literature there has been considerable research interest in the so-called service dominant logic of business (SDL). The SDL reconceptualises services and the nature of business exchange. Services as defined by Vargo and Lusch (2004), can be characterized as activities in which providers and customers co-create value. Principles of the SDL include that the customer is always a co-creator of value, and that the enterprise cannot by itself deliver value, but only offer value-propositions to customers (Vargo et al. 2004). In the SDL, a "service" has the following characteristics[1]: 1) it identifies or develops core competences that constitute the set of knowledge and skills of an economic entity that together must offer competitive advantages; 2) it has the ability to attract other agents or potential customers that could benefit from these competences; 3) it has the ability to cultivate relationships that involve the customers in developing and co-creating customized offerings; and 4) it includes mechanisms to gauge feedback from the market to support continuous improvement.

e-Recruiting Services

Internet-based and online applications are very widely used for recruiting functions. However, existing e-recruiting systems have a number of acknowledged issues and limitations. It is easy for applicants to complete an online application, and there is little motivation to keep the details up to date. This leads to a pool of on-line candidate pool with out-of-date resumes, who may not be actively job seeking (Furtmueller et al. 2011). Further challenges exist in effectively matching applicants to jobs. There is no standardised vocabulary for job titles or skills; so matching is an inexact process (Furtmueller et al. 2011). Many current e-recruiting systems are relatively ineffective at searching resumes and identifying suitable applicants (Furtmueller et al. 2011).

Viewed from a SDL perspective, HR and recruiting functions appear to be ideal candidates for reconceptualization using a SDL lens. The HR and recruiting functions can be seen as "services" in that they provide specialised knowledge and skills in attracting and retaining staff at all levels (Hough et al. 2000), for the benefit of the individual staff

[1] There are other definitions of the term "service" to which these characteristics will not necessarily apply.

members, the competitive position of the organization, and the ultimate benefit of its stakeholders (Anderson 2003).

E-Recruiting and the SDL

However, many existing e-HRM systems were not designed based on SDL principles, and have limited facilities for value co-creation, cultivating relationships that involve customer in developing customised offerings, and engaging in continuous improvement based on market feedback. E-recruiting services that foster an ongoing communication with current and potential candidates have been found to be more effective than those that reply on applicant pools which are frequently inaccurate or out of date (Furtmueller et al. 2011). If recruiting aims to co-create value between applications and recruiters, then a limitation of many existing e-recruiting services is that they take a temporary transactional approach to the relationship between applicant and recruiter, centred on a response to a specific vacancy. Opportunities exist to improve "stickiness", ongoing communication, and co-creation between the parties, including: corresponding with applicants about their desired job, as well as their fit to current vacancies; enhancing the playfulness of the interaction; implementing skill competitions; providing the ability for applicants to rank themselves compared to other registered applicants on the site; and regular prompting of applicants to update their details (Furtmueller et al. 2011). Opportunities also exist in unique market niches. While many recruiting functions are common across organizations, the vocabulary, skills and qualifications associated with specific niches such as health professionals or engineers varies enormously. E-HRM services that can be easily adapted to support one the one hand, the requirements of employers in specific market niches, and on the other hand, the aspirations of individual applications, will have an advantage. Finally, the ability to gauge feedback from the market could be improved for many existing offerings. This is challenging in a dispersed, multi-organization, multi-national, recruiting environment. From a recruiter's perspective, e-recruiting services should be customisable and extensible to their requirements. At a market level, success can be gauged by the popularity and market-share of the service offering.

Action design research

Action Design Research (ADR) was proposed by Sein, Henfridsson et al. (2011) as an extension of Design Science (Hevner et al. 2004) that posits that IT artefacts are ensembles shaped by the organizational context. In ADR the research process includes building the artefact, intervening in the organization, and evaluating the artefact as interwoven and concurrent processes. The ADR method consists of four stages supported by seven principles. The stages include: problem formulation, which identifies and conceptualizes a research opportunity based on existing theories and technologies; "building, intervention and evaluation" (BIE), which involves building the artefact, intervening in the organization, and concurrently evaluating and shaping the artefact to the context; reflection and learning, which moves from developing a solution to a particular instance to applying that learning to a broader class of problems; and formalization of learning, which allows the situated learning from an ADR project to be further developed into a general solution for a class of field problems. The ADR method also includes several guiding principles and "critical elements". These include: the importance of long-term commitment from the participating organization; defining the problem as an instance of a class of problems; practice-inspired research, which emphasizes viewing field problems as knowledge-creation opportunities; the theory-ingrained artefact, which emphasizes that the ensemble artefacts created and evaluated via ADR are informed by theories; reciprocal shaping, which emphasizes the mutual influence of the IT artefact and the organizational context; mutually influential learning among project participants; authentic and concurrent evaluation, which emphasizes that evaluation is

continuous and *not* a separate stage of the research process that follows building; guided emergence, which aims to capture interplay between structured external intervention and organic evolution; and generalized outcomes, which represents the move from the specific-and unique to generic-and-abstract.

THE CONTEXT OF THE STUDY

We report on an e-recruiting portal was conceptualised, designed and developed based on SDL principles, using open source, semantic web components. The goals and principles for designing the service included: it should be easily customizable to market niches, it should automate semi-structured processes such as resume matching that were previously done manually, it should be context-aware, and able to ask different questions depending on previous responses; it should offer added value to encourage loyalty and commitment to the service; and it should provide a range of tools for self-evaluation and self-development for applicants, such as skill tests and evaluations of fit-to-job.

These goals were realised through a number of sematic web-based IT service components which were critical to enabling the servitized business model. Some of the most important are summarised briefly. 1) A *conceptual ontology* for HR sourcing and digital resume design. Due to variations in job titles, skill descriptions and qualifications many existing systems capture free-format, unstructured resume information, which are not able to be automatically searched, classified and matched. This restriction has perpetuated time-consuming manual processes for analyzing resumes and matching applicants to jobs. Therefore a systematic ontology was required. A conceptual representation of resume forms was developed based on: analyses of personnel selection and resume literature; interviews with recruiters (Ettinger et al. 2009); interviews with applicants (Furtmueller et al. 2011); content analyzing resume forms on 40 e-recruiting systems; and usability testing of resume forms (Jansen et al. 2009); 2) A *workflow for ontology extension*. Since any classification system will be incomplete (Maedche and Staab 2001), a workflow is required for applying and enhancing the framework for new jobs, resumes and other categories. This included a sophisticated *web crawler* component that continuously searches online for new listed jobs, and stores them in a database for classification. The terms used are then analysed to check if current HR ontology already knows the terms. New terms are placed in a *grey-list* for classification. Following initial classification of grey-list entries, users (i.e. applicants, recruiters, developers) are "crowd-sourced" to confirm the categorization of unknown terms. This allows the ontology to be continuously learning, adaptive, extensible, and quality assured by its user community. 3) *Intelligent and adaptive searching and matching components.* These enable an automated "dialogue" between applicants and the portal, and provided improved service levels for both recruiters and applicants. A recruiter may be looking for a candidate that knows Java. However, knowledge of a programming language occurs in a range from novice to expert, and different users will interpret their skill level differently. Similarly, an applicant may report their skill as "object-oriented development" rather than Java (or vice versa). The search component allowed recruiters to: a) prioritize applicants' level of Java knowledge into various excellence levels; b) offer skill tests when filling in resume forms to obtain a more objective comparison of resume data; and c) identify applicants to recruiters who filled in related skills. For example Java is an object-oriented programming language, and so if the user fills in another object-oriented programming language this applicant may be also recommended by the system. Applicants could also obtain an automated initial evaluation of their fit to the job requirements, and a percentage ranking against the job requirements and other applicants.

As well as the adaptive and leaning components, another point of differentiation was that the on-going management and governance of some of the services was partly devolved to the user community. Since the portal operates not only in a multi-organizational context, but a multi-country context and across many different business domains, it would be unwieldy to have a centralised governance structure. Instead, user communities are able to set local standards (e.g. to comply with local legislation), and to crowd-source information about local educational institutions and qualifications.

Overall, these components enabled a value proposition that was easily extensible to new customers/markets (service characteristic 2); had the ability to involve stakeholders (including recruiters and applicants) in co-creation, extension and adaption of the service (service characteristic 3); and included both market and technical mechanisms for gauging and responding to feedback (service characteristic 4).

RESULTS: THE PROJECT VIEWED AS ACTION DESIGN RESEARCH

In the following table (Table 1) we describe the e-recruiting service development project framed by the ADR method. In the first column, the stages, principles and steps of ADR are listed. In the next column, we describe the project. In the third column, we reflect on the project of designing using SDL principles in an ADR context. This results in one of: 1) confirmation of the general principle/step in ADR; 2) a requirement for extension to the general ADR principle/step for in an SDL design context, or 3) elaboration, by adding detail and insight to the application of the general ADR method, without changing the overall intent of the method.

Table 1: The Project as ADR

ADR Method	**This project**	**Implications for the ADR method**
Problem Formulation Critical elements:		
1. Securing long-term commitment from the participating organization	The project was a long-term collaboration between researchers at the University of Twente, and a group of entrepreneurs, so commitment from both researchers and practitioners was embedded in the project from its inception.	Confirmed.
2. Defining the problem as an instance of a class of problems	This project aimed at developing a value proposition in the SDL paradigm that was extensible and adaptable to multiple e-recruiting problems in multiple business and cultural contexts. This required an ability to conceptualise e-recruiting as a class of problem from the outset (rather than by abstracting the learning at the end)	Confirmed and elaborated. ADR appears to be designed for a single organization context and may require extension for a multi-organization context. Design in the SDL paradigm requires conceptualising the problem as a class of problem from the outset.
Principles:		
1. Practice-inspired research, emphasizes viewing field problems as knowledge-creation opportunities	This project took place at the nexus of theory and practice, and was jointly motivated by theoretical and applied academic studies in the E-HRM area; field-based research that found that many existing e-recruiting solutions have failed to fulfil their promise; theoretical and applied knowledge in service management; and theoretical and applied knowledge in semantic web technologies from software engineering communities (for example Maedche and Staab, 2001).	Confirmed

2. The theory-ingrained artefact, which emphasizes that the ensemble artefacts created and evaluated via ADR are informed by theories.	This project pre-dated the publication of research that might now be considered theoretically relevant. Identifying and selecting appropriate theory was non-trivial, and the development interacted with theory, rather than being informed a priori by theory. For example, emerging research on service development life-cycles suggested that that traditional software engineering methods do not apply in this context (Papazoglou et al. 2008); although we came to disagree with this position. However, IT-enabled service development methodologies and processes have only just begun to emerge in the literature (for example, Conger 2011). Recent examples of service engineering methodologies had limitations for our purposes, for example, they were highly conceptual and not well grounded in practice (Chesbrough et al. 2006; Gupta 1991; Korthaus et al. 2007); designed for a particular context (Teubner 2007); or covered only a subset of the life-cycle (Kohlborn et al. 2009).	Extended. ADR implies a managed, linear approach to the interaction of theory with artefact development. However, the theoretical foundations for service design and development are multi-disciplinary, dynamic and currently emergent from the research discourse (so there was not necessarily sound theoretical foundation to begin with). To this extent, they did not provide a mature and stable body of theory ex ante that could be used to inform the design process.
Steps in this stage: 1. Identify and conceptualize the research opportunity 2. Formulate initial research questions 3. Cast the problem as an instance of a class of problems; 4. Identify contributing theoretical lenses and prior technology advances 5. Set up roles and responsibilities.	**Steps 1, 3 and 5**. Joint business and technology leadership roles were essential. The initial research questions were informed by e-HRM studies and involved asking how e-HRM services could be developed to be more interactive, learning, adaptive, and contextual – that is, how a "class" of e-recruiting components could be developed that could be adapted and shaped to different individual, organizational and cultural contexts. This informed the design of the IT artefacts. Conversely, semantic web methods and technologies enabled the development of the required open and adaptive service components.	Confirmed and elaborated. Design based on SDL principles encourages conceptualisation of the problem as a class of problems and is highly synergistic with ADR.
	Steps 2 and 4: This project was informed by researchers from multi-disciplines including human resource management and computer science/semantic web. Further, the "practitioners" involved were highly educated, many to at least masters level; and some had authored scholarly publications. Overall, it is difficult to abstract any single theory or class of theoretical knowledge that uniquely informed the design and execution of the artefact, or that exhausts the potential for theory extraction from the project. We view the collective array of theoretical knowledge and practical experience within the project as a rich and creative resource which lent itself to multiple theoretical contributions. For example, we came to believe that aspects of the initial conceptualization of e-recruiting as a dialogue and a relationship rather than as a transaction; understanding of the issues involved in maintaining the	Extended. There was not a clear line (as is suggested in ADR) between researchers and practitioners. We posit that in an SDL paradigm, there is a much more iterative and emergent interplay between theoretical lenses and artefact development, *and* between the theoretical and practical contributions made by the multiple stakeholders, than is suggested in ADR. Interaction and guided emergence occurred between theory from multi-disciplines and artefact development as well as between artefact and organizational context. Research questions need not be a priori, and theoretical insights may be emergent during design, development and implementation. Co-creation and exchange between stakeholders, and the ongoing adaption of the artefact itself by new communities, introduces, and in fact encourages, the possibility of the introduction of new theoretical

	knowledge base; and a decision to design intelligent and adaptive components that could access distributed and crowd-sourced knowledge were fundamental to the success of the service offering. The method used for the project could offer a potential contribution to service development methodology literature. Innovative component design that has been extensively tested in practice may provide a potential contribution in the software engineering community. The business model and the service conceptualisation may offer a contribution for e-HRM researchers. There are potential contributions that were not planned or articulated in advance. We suggest this level of creativity, diversity and mutually in the interplay between practice and theories from multiple disciplines may not be unusual for innovative and entrepreneurial service initiatives.	perspectives. The initial research question(s) could evolve or change in the course of the development. The most appropriate theoretical lenses for deriving new knowledge from a SDL project may only become apparent with critical reflection and hindsight. This suggests that the linear flow proposed for ADR may require extension in order to effectively capture learning from multi-disciplinary service design research.
<u>Building, intervention and evaluation</u> Principles: 3. Reciprocal shaping, emphasizes the inseparable influences mutually exerted by the two domains: the IT artefact and the organizational context 4. Mutually influential roles, which points to the importance of mutual learning among the different project participants	The project was jointly led by a technology entrepreneur and a human resource management specialist, engaged in ongoing dialogue throughout the project. Neither perspective was privileged.	Confirmed
5. Authentic and concurrent evaluation, which emphasizes a key characteristic of ADR, that evaluation is *not* a separate stage of the research process that follows building.	Since services are aimed at a community, involving collaboration in highly distributed environments (Papazoglou et al. 2008), and therefore need to be evolutionary and adaptive, it is acknowledged traditional models of testing are unlikely to be appropriate for the design and deployment of such services. In this project, the semantic web components were continuously evaluated within the target domain during the development process. For example, the effectiveness of the crawler and ontology maintenance workflow component in identifying jobs and dealing with new terms could be evaluated against real-world job postings. At a business level, the uptake of the portal, and the ability of effectiveness of the components in developing customised portals for niche markets were crucial evaluation criteria, rather than conformance to requirements per se. The ability to evolve in a way that can incorporate new knowledge and continue to offer a compelling value proposition for applicants	Confirmed and elaborated. Service development using SDL principles is fully congruent with ADR. However, the principle of concurrent evaluation could be further extended in a service context. Services may not necessarily ever be considered "complete" and technical and business adaptability (rather than "completion" or "conformance to requirements") may be critical evaluation criteria.

	and recruiters was essential to the uptake of the portal by new customers.	
Steps: 1. Discover initial knowledge-creation target 2. Select or customise BIE form 3. Execute BIE cycle(s) 4. Assess need for additional cycles, repeat.	The development largely followed software engineering/semantic web principles. As we noted above, the portal components were developed and are maintained in an environment of continuous evaluation, improvement and market responsiveness.	Confirmed and elaborated. The general ADR method may need further extension for guiding development and capturing learning and theoretical insights in a servitized, entrepreneurial or inter-organization development context.
<u>Reflection and Learning</u> Principle: 6. Guided emergence, which aims to capture a vital trait of ADR, the interplay between the two seemingly conflicting perspectives of structured external intervention and organic evolution. The artefact will reflect not only the preliminary design created by the researchers but also its ongoing shaping by organizational use, perspectives, and participants.	In order to allow the components to be shaped by specialised employment niches, and new national, organizational, cultural contexts; an extensible ontology for e-resume fields was designed, supported by a workflow process for carrying out extensions. The IT components were designed for ongoing shaping by the community. At an individual level, for job-seekers, rather than simply requiring applicants to fill our resume fields, the software implemented an intelligent and adaptive search and matching process. This provided a digital "dialogue" between the recruiting software and the applicant, which is similar to that normally conducted by human agents. Also, the data entered by participants could be used in turn by the ontology extension workflow, to enrich and shape the overall vocabulary of the service domain.	Confirmed and elaborated. Guided emergence and the ability to interact with, and be shaped by the environment is not characteristic only of service development utilising an ADR approach, but may helpfully be considered as an essential characteristic of design in the SDL paradigm. In a traditional software life-cycle, maintenance and enhancement is something that takes place in a series of bounded and finite cycles (closed processes) after the initial implementation of the software. In a service life-cycle the components need to be able to engage with their environment in open and adaptive processes (Fielt et al. 2010). The ability to adapt, learn, self-manage and self-configure for multiple environments needs to be engineered into the components (Papazoglou et al. 2008).
Steps: 1. Reflect on the design and redesign during the project; 2. Evaluate adherence to principles 3. Analyze intervention results according to stated goals.	We noted previously that designing in a SDL paradigm using semantic web components requires ongoing reflection, feedback, and interaction with the business domain. Ongoing adherence to the goals of developing a generalized, but adaptable solution, and software components that were capable of dealing with semi-structured as well as structured dialogues and decisions was essential to the success of the project. Abandoning these goals in favour of a more specific, less adaptive solution would have removed key points of differentiation from existing solutions.	Confirmed and elaborated. The ability for stakeholders to appropriate, shape, contribute to, and "co-create" service offerings is central to the SDL. We suggested earlier that theoretical contributions from service development projects might continue to emerge retrospectively in reflection on aspects of the service completed so far (remembering that services may continue to evolve). In a project informed by multiple disciplines, there is potential for theoretical contributions in more than one context. This project could potentially offer insights in fields as diverse as human resource management, effective leadership styles for service management, service development methodologies, and sematic web.
<u>Formalization of Learning</u> Principle: 7. Generalized outcomes, which represents the move from the specific-and-unique to generic-and-abstract. This can take the form of either (a) generalization of the problem	As we discussed earlier, generalization of the solution instance was a key goal and design principle from the outset. Derivation of design principles for IT-enabled services in the SDL paradigm is also a possible outcome.	Confirmed

instance, (b) generalization of the solution instance, and (c) derivation of design principles from the design research outcomes. Steps: 1. Abstract the learning onto concepts for a class of field problems; 2. Share outcomes and assessment with practitioners; 3. Articulate outcomes as design principles; 4. Articulate learning in light of theories selected; and 5. Formalize results for dissemination	In this stage of the project, the authors identified a "David and Goliath" problem which has resonated with other researchers working in related areas. There are are non-trivial obstacles to appropriately abstracting and reporting the design and methodological insights for a multi-disciplinary project where the disciplines independently have large literatures. In this case, E-HRM, the SDL, software engineering and semantic web all have very large literatures. If we consider the case of software engineering literature alone, we note that there are even large literatures associated with specific sub-topics within software engineering, including (among others) topics as diverse as requirements elicitation, modelling notations and languages, testing, leadership styles, quality management and software design patterns, in total, there are probably hundreds of thousands of articles. Within these, there will likely be many principles that can be adopted, or adapted to a service development context, or that already exemplify SDL principles. However by contrast with the maturity of software engineering disciplines, clearly articulated methodologies for service design emerging from the SDL community are still scarce, and frequently highly conceptual. The differences in the scale and maturity of the respective bodies of knowledge mean that it is hardly possible to perform a rigorous and detailed comparison between on the one hand, the design principles derived from this (or other) SDL projects and the emerging, incomplete, and immature service design methods literature; and on the other, all the principles articulated in the vast, diverse spheres of software development literature. There is too great a mismatch of scale. This issue is multiplied further when we consider the other literatures that informed the project.	We elaborate on the ADR by identifying some practical difficulties at this stage of the ADR method for extracting and reporting on theoretical contributions in a multi-disciplinary context. Further, the continual interplay and "guided emergence" between the e-HRM business domain, the e-HRM research literature, the SDL research literature, and researchers and practitioners in the semantic web development community that occurred in the project mean that selecting a single theory is likely to present a reductionist and misleading picture.

CONCLUSION

The principles of ADR that relate to conceptualising the business problem as a class of problem and reciprocal shaping, were confirmed and shown to be synergistic with service development and SDL principles. The generalised characteristics of E-recruiting were conceptualizing from the outset, rather than specific organizational or national requirements.

We identified a number of areas for potential enhancement of the ADR method. ADR assumes a "closed" single organizational context, while the creation of services (in the SDL sense of service) may take place intra-organizational, multi-stakeholder environment. We suggest that in addition to reciprocal shaping between the artefact and the organization, the principle of "guided emergence" is also relevant to the interplay between theoretical frameworks and design and development, particularly in a multi-disciplinary context. Theoretical contributions may be emergent and retrospective and not those that were not planned or articulated in advance.

A major difference from existing e-recruiting services was in the way that recruiting was conceptualised as an ongoing, IT-supported dialogue between stakeholders rather than a transaction based on a job vacancy. The components developed to support this vision were innovative, and the up-take and market success of the service suggests they offered a compelling value proposition. However, the design and build of these components relied heavily on existing software engineering skills and expertise. By contrast with some service development researchers, we found existing componentized software engineering disciplines and methods to be extremely effective in enabling and supporting a service development. We did however identify potential issues with reporting the learning from multi-disciplinary ADR projects, especially when one of the contributing literatures (in this case software engineering) is extremely large and mature. This makes identifying points of similarity and departure potentially unwieldy, or conversely, dangerously over-simplified.

Innovative real-life service developments are messy, evolutionary and non-linear and may draw on tacit and explicit knowledge from many disciplines, and incorporate elements of a-theoretical experimentation and creativity. This can make them difficult to present truthfully from a research perspective, The ADR method offers an effective approach for reporting service development projects which may be enhanced further as more projects of this nature are carried out.

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Sprouts
University of Amsterdam
Roetersstraat 11, Room E 2.74
1018 WB Amsterdam, Netherlands
Email: admin@sprouts.aisnet.org

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